11-91

Price: $1.50
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Zero Beat

November 1991

Hampden County Radio Association, Inc

Springfield, Mass

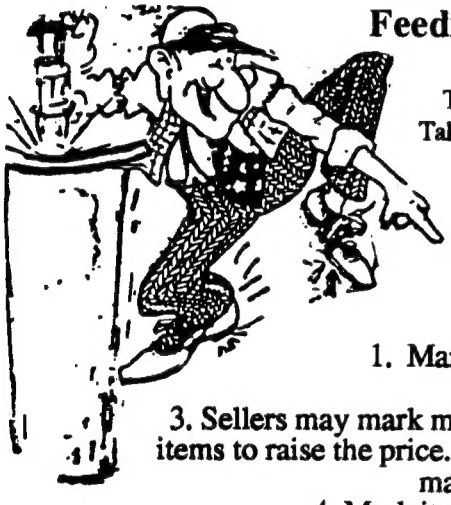
Our 44th ARRL Affiliated Year

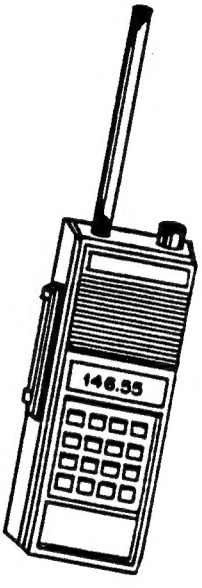
Annual HCRA Auction

Friday November 1st, 1991

50/50 Raffle!

Doors open at 6 pm, Auction starts about 7 pm





Feeding Hills Congregational Church
Feeding Hills, MA

This is at the intersection of routes 57 and 187.
Take 57 West from Springfield, turn right onto 187,
and church is immediately on your left.

Auction Rules

1. Mark all items clearly with name and/or callsign.
2. Club takes 10% of every sale.
3. Sellers may mark minimum bids on an item. And the seller can bid on their own items to raise the price. There is no charge if the seller buys the item. However, you may NOT put it back into the auction again.
4. Mark items being donated to the club as a "DONATION".
5. Seller guarantees the item, not the club.
6. Items must be electronics/ computer/ ham radio related.

If you brought it, and it doesn't sell, you bring it home!
Put interesting information on the item, that will help to get a higher price. Don't assume the auctioneer knows what the item is or what it can be used for. (He needs help.)

AUCTIONEER HAS THE FINAL SAY.
DISPUTED ITEMS WILL BE PUT UP FOR BID AGAIN.

Help advertise this to benefit the club.
Bring things to auction off. Bring two friends!

In This Issue:

Upcoming Issues:

President's Corner

By

Bob Lafleur NQ1C

Greetings. As the days get shorter, and the weather gets cooler, it's time to start thinking about making those final adjustments to your antenna system before the tower gets covered with ice. And it's time to start thinking about what new radio toy you will buy yourself for Christmas this year!

I was thinking about doing a little antenna work before we need the de-icer to go up on the tower. But as always, the small ideas turn into large projects! I want to put an 11-element 440 beam on the tower to point at Easthampton, because I will be adding a 2400 baud packet link between our BBS and the K1MEA BBS. So I thought "while we're up there, I might as well add some other antennas I might use in the next year or so... 903, 2304, 3456". But what good are antennas without feedlines? So there goes 300 feet of coax. But if I'm going to put up 903, 2304, and 3456, well, I might as well add the transverters up on the tower too. And since I'm doing all this, why not make the transverters put out as much power as possible? Amplifier modules for them? Oh yes, and preamps, too!

So now on the Christmas list we have 4 antennas, 300+ feet of coax, 3 transverters, 3 amplifier units, 3 preamps, a pile of connectors, a weatherproof enclosure, and who knows what other odds & ends. This also means more cables down in the shack... Heck, I haven't even finished straightening out the ones from last year's antenna work!

So what else should I do up on the tower while we're at it? Maybe a TV antenna? (I refuse to get cable). Hmmm... I don't even have a TV in the shack!

Does this scenario sound familiar to you? Start off with a simple plan, and end up with something blown totally out of proportion. Actually, I'm probably a little more afraid of tower mounted transverters than I should be. There's all those unknowns... T/R switching, getting the output of the 2m rig low enough so I don't blast a hole in the transverter, not knowing exactly where I am on the band, and it goes on and on. But there's always room to try new things in amateur radio, that's for sure!

I'm continually amazed at new technology. I just used a DAT (Digital Audio Tape) 4mm backup system to back up my computer's hard disk. Wow! These cartridges are very small, and even the tape drive itself is smaller than the first floppy disk drive I ever had. The tape holds an incredible 1.3 GIGAbytes, that's about thirty 40-megabyte hard disks. And it's much faster than any tape backup system I've used before. 10 years ago, you were lucky to have a 5 megabyte hard disk, now 10 times that is commonplace, and 100 times that is within the reach of any small business.

So what is this technology boom going to do to amateur radio? Well, just look at what it has done already. What kind of rigs did we have 10 years ago? Digital displays were just becoming commonplace, and memories were still unheard of. Now, we've got rigs with CRT displays, that can communicate with computers and each other, and even talk. You can key a callsign that you hear on a keyboard, and have your antenna automatically turn to the proper direction. You can set your 2m rig up so that the squelch only opens when your friend keys in your private code. What next? I can't even begin to dream about the equipment that will be available 10 years from now.

But back to the present. You can get today's (and yesterday's) equipment at our auction, so come on over on November 1st and see what kind of buys you can find! See you there!

73, Bob

Editorial

By

Jeffrey J. Duquette K1BE

I found out that the October issue of Zero Beat generated quite a bit of whining. I never heard a word until I went to the Board of Director's meeting and listened to the litany of complaints. I am solely responsible for what appears in Zero Beat. Articles are plainly labeled as to the author, but I'm always the one who decided to print them.

For the dim bulbs in the audience, an editorial is "personal opinion". If you disagree with anything the editorial writer has to say, write in and room will be made for your rebuttal.

I do the best I can with every issue. My goal is that the newsletter should engage your brain and make you THINK! Trying something new won't cause your brain to implode (in most cases). No attempt is made to cover national ham radio happenings, I assume if you're interested you buy QST or another national magazine. If you don't like something in Zero Beat you should complain in writing to me, not the board members. Keep in mind that this is a volunteer, no-pay, big hassle job. If I don't like the bitching, all I can do is walk away from the task.

I have asked in the past for help putting each issue out. I really need people to mail and collate every issue. I need an automatic stapler. I need an old callbook to look up addresses. What I don't need are people who sit on their hands nit-picking every edition to death!

For Sale:

Yaesu FT 470 duoband handi-talkie, with spare battery pack, DC adapter, and 2m/440 Super Stick antenna. $420.00

Kenwood 315A 220 HT spare battery pack, Super Stick antenna, $250 BOTH for $600!

Phil 549-4875

Welcome New club Member: John Shyloski N1KFD !

Cushcraft 230WB 2m Beam Antenna

By: Dave Jenkins, WB6RBE

It is said that good things come in pairs, and the Cushcraft 230WB 2m beam is no exception. This beam antenna consists of two 11-element 215WB beams connected together such that the resulting antenna has twice the gain of a single antenna. I wanted to be able to work simplex into the Bay Area (San Carlos, Menlo Park, Etc.), and the 10-element Yagi I had up couldn't provide a strong enough signal to maintain a packet connection (packet is more demanding than voice). To increase my signal strength, I could either increase my power beyond the 160 watts I have available, or increase the gain of the antenna on the tower. To me it made sense to put up a larger antenna, because not only the transmitted power increases, but the antenna gain increases the signal to my receiver, a double benefit. After studying the Cushcraft antenna catalog carefully, I chose the 230WB antenna as a compromise of performance, physical size, and cost.

The 230WB is not a small antenna: the boom separating the two beams is 11' long, and each beam is 15' long. As large as it is, Cushcraft has kept the weight down. Fully built, the antenna weighs about 25 pounds, a manageable weight when climbing a tower and installing it.

Assembly of the antenna required about six hours, part of which is due to the confusing documentation Cushcraft supplies. Apparently there was a paper shortage when my antenna was packaged, because instructions for assembly of each beam were tightly compressed with few illustrations to aid the builder. I had to rebuild the first beam I assembled due to confusion over the instructions, but I made up for lost time on the second one.

Connecting two beams together requires a phasing harness (specially constructed coaxial cables) and a special boom to support the two beams. Again there must have been a paper shortage, because the instructions for this portion of the project were combined with instructions for a different antenna as well as safety instructions. This didn't make assembly of the phasing section any easier. Perhaps our editor could offer Cushcraft an organized, user-friendly approach to antenna assembly. For the average ham, I strongly recommend getting an experienced ham to lend assistance when building this antenna.

The manufacturer does not stress the importance of balancing this antenna when assembling it. Mine was slightly out of balance, which made installation on the tower mast difficult. When assembling the two beams on the connecting boom, be sure that the final assembly balances when held by one hand.

So much for the bad news. The components used in the antenna appear to be first-class and rugged. I expect this antenna to provide many years of service.

The manufacturer claims that this antenna has a gain of 18.5 dB, which means that my transmitted signal power will appear to be amplified by a factor of 71 times. In addition, the front-to-back ratio is 24 dB. This means that a signal of a given strength at the front of the antenna will appear to be 24 dB weaker if it were at the back of the antenna. Working with the antenna, rotating it through various repeaters, the performance seems to be in accordance with the manufacturer's claims. The one performance area that is something of a problem, is the response of the antenna when it's pointed slightly away from the desired station. This Off-axis response is typical of any antenna, and with this one there appear to be two minor "lobes" of response on each side of the actual antenna direction. Thus to point the antenna at a station whose direction is not precisely known, the antenna has to be rotated until the peak signal has been observed on the S-meter. This situation has to be considered carefully because of the high gain of this antenna. This antenna is most effective when used with a rotator that displays antenna direction so that after determining the direction to a distant station, it can be "dialed-in" accurately without searching for peak S-meter reading. Cushcraft says that the width of the beam on this antenna is about 18 degrees.

As I mentioned earlier, the ten element beam I had on my tower previously could not provide reliable packet operation into the Bay Area. With the 23OWB this is no longer a problem. For those hams who want more performance, the 230WB is an excellent choice.

The list price of the 230WB is $365, and most dealers can discount that considerably.
tnx - SFARC

Contacting The Club President

Comments or ideas can be communicated to our club president at this address:

Bob Lafleur NQ1C
45 Ionia Street
Springfield, MA 01109
Telephone: 737-8503

Zero Beat Deadline

Two weeks before the club meeting is the deadline for submission of award winning manuscripts and personal ads. Paid ads require a month's leadtime! i.e. like the Rutland Array ad in every issue. The editor's address is:

Jeffrey J. Duquette K1BE
18 Anvil Street
Feeding Hills, MA 01030-1530

MICROWAVE NEWS

by Alan Rutz, WA9GKA

This article is presented to summarize some of the experiences of the Midwest Microwave Society, a small group which has existed in this area for the last three years, and which promotes the use and experimentation of Ham frequencies above 1000 MHz, where "microwaves " begin.

HISTORY OF MICROWAVE

Experimentation of microwave frequencies dates back to the earliest days of radio, when simple experiments showed the possibility of creating oscillations of several thousand megacycles, but the use of most of these higher frequencies was not great, and was a slow process except for the last 10 or 15 years. Since 1975, research and development of military applications has pushed the useful range of microwave frequencies all the way up to around 150 Ghz, and it is now quite easy to generate reliable and economical signals on any of our lower ham microwave bands, such as 1.2, 2.4, 3, 5, 10, and 24 Ghz.

HOW CAN I HAVE FUN WITHOUT SPENDING MUCH MONEY?

The cheapest way to get on microwave frequencies is to purchase a Gunn Oscillator for the band of your choice. The cheapest of these is the 10 Ghz band, where Hams have 500 megacycles to work with! Try and find a unit that comes with a built-in Detector Diode for receiving signals, although units can receive fairly well just using the GunnDiode (transmit diode) itself, if that is what you find!

HOW DO I MODULATE IT, AND HOW FAR CAN I REACH!

The cheapest and easiest modulation method is plain, ordinary frequency - modulation. Gunn diodes are especially easy to fm modulate. They normally run on about 8 volts, and allowing this voltage to vary at an audio rate just a few millivolts is enough to create several hundred kilocycles of deviation! A good receiver of these relatively wide - band fm signals is an ordinary automobile am - fm radio, with its Motorola - style antenna connector hooked to the gunn detector diode by a piece of coax cable. This arrangement can transmit and receive about 3 miles in the clear, providing the gunns are oscillating about 100 MHz apart from each other. You can tell when they are, because the fm auto radios will let you know!

WHAT USES DOES IT HAVE FOR ME?

Do you have a buddy who lives a couple of miles from you? Do you want to experiment with Ham television? Do you want to install a remote receiver somewhere Would you like to run a data link at fast rates? So many things can be done with microwave, it's hard to imagine them all. The author dreams of many of these microwave links all hooked together, able to carry hundreds of voice - channels between cities and towns, so we can make it faster and easier to communicate by Ham Radio.

WHAT OTHER CRAZY THINGS CAN I USE MICROWAVES FOR?

Are you tired of having truckers glued to your tailpipe as you drive down the highway? Would you like to listen to the electronic noise coming down from the Heavens? Would you benefit from being able to listen to something several hundred feet away without needing a microphone over there? All of these problems have really good solutions using microwaves, although I hasten to add that some trucks get honked off if you blast their fuzz - buster and can dump you in the ditch pretty easy!

WHERE DO I FIND THE PARTS?

This is the part I take a beating if I use the space for advertising, isn't it? I have really enjoyed the last several years, experimenting with microwaves, and it is true that I have equipment ready to sell. You can say that I am enjoying the fruits of my enjoyment in Ham Radio! I am not the only way to get parts and information. I went out and found it myself, and it's available, such as a fine book from the Radio Society of Great Britain, along with a nice little experimenter's booklet from the San Diego Microwave Group, Our Midwest Microwave Society also publishes a small 10 page booklet describing in text and drawing some of the facets covered above, and it costs $5 from Midwest Microwave Society 7102 W. 500 S., LaPorte IN, 46350. After deducting the cost of duplication, the cost of the envelope, the cost of the stamps, and the cost of the paperwork, and disregarding the cost of the time involved, the remaining $3.25 goes toward the cost of installing the first permanent, full -time microwave links in Northern Indiana. For an SASE, you can also receive a listing of available parts and kits.

WHAT HAS THE MIDWEST MICROWAVE SOCIETY DONE ALREADY

We spent the first 6 months experimenting with the range of our transmitters to common fuzz - busters. We found that there is some difference in fuzz -busters but not too much difference in our gunn sources. We know we can blast a fuzz - buster from at least a mile away (or more) on level ground. We know a lot about the response - time of some fuzz - busters. We know not to hook a gunn source directly to a car battery We know it's downright difficult to keep a gunn source on one specific frequency, and found out how to solve the problem. We have been mobile on both 10.3 Ghz and 24.2 Ghz! (OK so it wasn't exactly as good as the Lakeve Society's abnormal and infrequent Newsletters, please send your name and address to me. De Alan Rutz, WA9GKA/PAS F9BCJ, ON8UB, 7102 W. 500 S., LaPorte, IN 46530

Membership Dues

$10.00 per season! Mail to the treasurer:
Greg Stoddard N1AEH
1500 Mapleton Ave
Suffield, CT 06078

REVIEW: Diamond X-500 2m/440 Antenna

by

Dave Jenkins WB6RBE

Like many other members of our club, I have become active on both VHF and UHF,and am considering buying a dual-band rig. With the purchase of a packet TNC, I wanted separate antennas for the 2-meter voice rig, and the rig dedicated to packet. With an antenna already on my tower, the other logical location for a 2-meter antenna was the chimney, since packet is pretty much a local-area communication mode. To keep the neighbors and my other half happy, I didn't want a plethora of antennas on top of the house, nor did I want multiple feed lines, and the Diamond line of multi-band verticals looked like a good solution.

A trip to "The Radio Place" in Sacramento brought me face-to-face with a variety of antennas including several of the Diamond models in which I was interested. A quick look at the Diamond catalog convinced me that the X-500 would suit my needs well. The antenna is a 17' vertical which acts as three elements on 2- meters, and 8 elements on 440. The manufacturer rates the gain at 8.3dB on 2-meters, and 11.7 dB on 440. These gains are comparable to those of beam antennas with 4-6 elements.

The antenna elements are housed in an attractive white fiber-glass housing with weather-sealing gaskets between each section. This version of the antenna uses an "N" connector which I prefer, since the connector is inherently weather-resistant.

The assembly instructions for the antenna are written in fractured English, which needs several readings and some thought before understanding what is required to assemble the antenna. The kit of parts consist of three sections of antenna, three radials, and a mounting kit. The difficulty in assembling the antenna is that inside each of the vertical sections is an element that must be brought out to mate with the next section to be assembled. It is important to start with T,he top section and work down to the base section. This is because the base element can not be moved, but the others can. Assembly of the antenna required about four, and the tools needed were a Phillips screw-driver and a Crescent wrench. Diamond provides special wrenches used to assemble the antenna sections.

After assembling the antenna, I set it up against the house, connected an "N" connector cable in line with a Sierra watt-meter, and measured the SWR across each band. Diamond indicates that the SWR will be 1.S:I or less across each band, and I measured the SWR of my antenna at 1.3: 1 or less, from 144-148 MHz and from 430-450 MHz. I didn't make any measurement of the gain, but all stations with which I communicate are much stronger.

Installation of the antenna on the chimney required about 2 hours using a chimney mount, and this includes running new feed line. Also, I had to replace two roof tiles I broke, but other hams may not have to do this.

The Diamond X-500 is ruggedly built and the performance seems to be all that the manufacturer claims. The antenna is a bit pricey, with a list price of $239. "The Radio Place" price was $209, and had I wanted to wait, and risk a UPS shipment, AES has it at $189. (Editor's note: Reno Radio has it for $169) I have one antenna, one feed line, great gain. Who could ask for anything more?

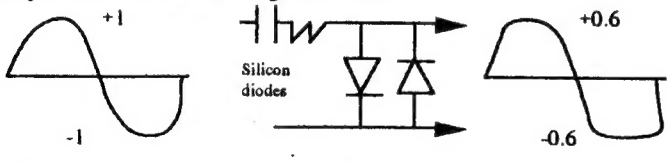
Speech Clippers

Audio processing, or speech clipping, becomes increasingly important when dealing with FM repeaters than in most other amateur voice communications. Not only do you want to put out a good quality signal which is comfortable to listen to, but you should also keep the modulation level, (deviation), about the same as everyone else on the "party line". Take a look at the schematic of your rig, and you'll probably see something close to what we will describe.

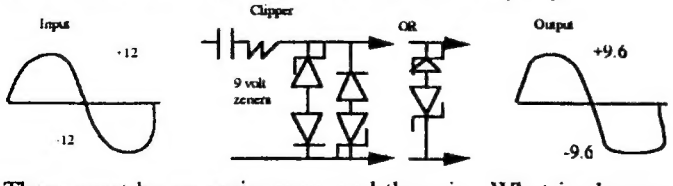
To process audio with a clipper, meaning to limit the peak amplitude without affecting the remaining speech waveform, you need two things: first, an electronic switch, usually a pair of diodes; and second, a reference point, usually a fixed voltage signal.

Using a diode as an electronic switch is old stuff in everybody's mind for a power supply circuit. The difference here is only the frequency, i.e. audio instead of 60/120 Hz. When the diode is forward biased, positive on the anode or plate with respect to the cathode, it conducts current or acts like a closed switch. When the bias voltage is reversed, the diode does not conduct; then it acts like an open switch. The bias voltage at which the diode starts and stops conducting is known as the "avalanche point" and is typically 0.6 volts forward bias for silicon diodes, and approximately 0.3 volts for germanium diodes.

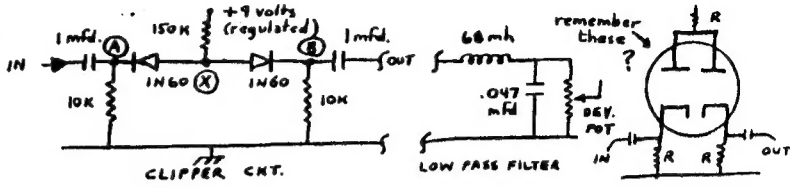
Since a diode behaves like an open circuit until the voltage across it reaches the avalanche point, the simplest clipper circuit would be a pair of back-to-back diodes connected across the audio line, possibly with a few resistors and capacitors thrown in for good measure.



This is great, but not everybody wants to clip at 0.3 volts all the time, so why don't we use zener diodes? Good idea? Nope, too expensive. The specified avalanche point of a zener diode is the reverse bias voltage, while the forward bias avalanche point is still the normal 0.6 volts. To make the circuit work the way we want it in an identical circuit arrangement we would need two more diodes connected in series as shown, plus the correct zeners to start with, or put zeners in series. But, they're too expensive anyway!



There must be an easier way, and there is. What is cheaper than resistors? All we need is a voltage divider circuit, and we can get any reference voltage we want, assuming we have something fairly stable to start with. So let's graduate to the final form, and examine one part at a time. This arrangement is lifted from between two audio stages in a TR-22.



First, the input and output coupling capacitors will only pass AC audio signal; this keeps our reference DC voltage from feeding back in either direction. The diodes, you will notice, are both normally forward biased, (like closed contacts) in this circuit. Anything we put in at A will come out at B with only a slight loading effect from our voltage divider, almost. Don't forget the forward and reverse bias phenomenon.

If our audio voltage going in at A swings positive, we are bucking the existing forward bias on the left diode, and helping it on the right diode. With enough positive voltage at point A, we can actually drive the left diode into reverse bias, or make it become an open circuit. This limits the positive peaks at X and at output B, no matter how positive the peaks get at input A. When the audio voltage swings back towards negative, it pulls points X and B with it until the diode on the right becomes reverse biased and opens up the circuit between X and B. This limits the negative going peaks at output B, no matter how negative they get at input A and point X.

The layout for a tube type clipper circuit is basically the same. A dual diode (usually 6AL5) has two plates connected together and fed from regulated B-plus; there are separate resister to ground from each cathode, and the audio is coupled into one cathode and out the other. As in the solid state arrangement, the resistors determine the clipping level.

Anyone who knows Ohm's Law and spend enough time will eventually figure out that each time a diode "avalanches" either on or off, the circuit voltages will readjust slightly and tend to switch it back, and produce damped oscillations. This together with the sudden avalanche triggering generates high frequency noise which must be filtered out before the frequency modulation stage, or it will cause over deviation by itself. That's why a speech clipper circuit is always followed by a low pass filter in a good design.

Reprinted from Intermod, October 1975, Mt Tom ARA

ON THE AIR FROM JAPAN

by

Dave Hyte, 7J1AIW/N4XPE

Well gang, here is my first article from Japan (and hopefully not the last,I guess all of you will tell Vince whether or not to accept any more email from me!) to let those of you interested in knowing what it's like over here in Tokyo and On The Air.

The current station configuration is my old half-size G5RV being fed with about 130' of RG8X with a Yaesu FT-1000D cooking it all. I know, I know, it's a bit of overkill for a G5RV but in the interim, "ya duz whatcha gotz ta duz" to get on the air, right?

So, what's the city like and how are the bands over here?

In Tokyo, IT'S CROWDED! On The Air, IT'S CROWDED on SSB and 40m CW. The WARC bands don't seem to see much action right here but, I'm only using my G5RV right now, so they may be and I just can't hear em! We seem to have a lot of action on 40m, 20m, 15m and 10m. So so on 12m and 17m (except for some pretty good DX into Western Europe at times on 18.077-080 CW) and almost nothing on 30m. Some on 80m phone but my Japanese is not quite up to that yet, and I have heard absolutely nothing on 160m and that probably IS due to the antenna I'm using. As far as the high band stuff goes, 2m is not frequented by "serious" amateurs here in Japan (according to local ham friends). It is mainly the haven of the uneducated and the notorious "JA Jammers."

What?!? You haven't heard of them?? Well, neither had I but let me enlighten you a bit. On 2m, and a goodly amount of 430 Mhz for that matter, there is an individual (they seem more like an organized group) of people that live merely to cause interference to, and stress upon, the general ham population of Tokyo.

I've asked friends and even representatives of the JARL, why is this allowed to continue? The general response is one of apathy and the belief that it is their prerogative to dishonor themselves in his manner. Also, according to a friend of someone at the JARL they [JARL] estimate that there may be over 100,000 illegally operating VHF/UHF transmitters in Tokyo alone. Ouch! He also alluded to the fact that if the Ministry of Telecommunications was to go after these people, they think it would drive many of them to HF and then we would all be in trouble. So, we live with it and QSY when we have to. As a result, I haven't used 2m more than once or twice, pretty much just to see if it works. Also,there are no 2m repeaters in JA to work anyway! Now, 430 Mhz on the other hand is extremely active with packet, repeaters all over the place, and nets. The Japanese are also heavily involved in 1.2 Ghz and above. They really seem to like the high band stuff, especially mobile. So, I may have to look for some "packet toys" when we cruise over to Hong Kong in May. Rumor has it that the club (TIARA)packet BBS here can now forward. The call is 7J1AAA in Tokyo.

Mobile here infers anything that is not at home or just too big to carry. Walking, bicycling, motorcycling, car driving, boating, scooters, mopeds, etc. I have seen a few, very unusual rig and antenna setups here. A friend has a Toyota with 430 Mhz, 1.2 Ghz, AM/FM/CD/Tape/SW, TV and even a scanner. The notable thing about all of this is that except for the 430 and 1.2 transceivers, all of it is built right into the dash at the factory! The CD/TV combination is great. He asked me my address in Shiroganedai and then popped a CD into the player. Up on the screen came a map of Japan with soft keys on the screen. He touched one for Tokyo and instantly the screen showed a map of all of Tokyo. Then he narrowed it further to the ward I live in, next came the ken or suburb and finally down to the block and street I live on. The building showed up with information of when it was built and the approximate size of it. Once he got the building, he touched a series of the soft keys and up came a slightly bigger map with his home area in one color, mine in another, and the routes/route numbers /roads /etc. marked in different colors based on statistical traffic patterns for the day of the week and the time of day.

Needless to say I was more than a bit impressed that this was available to him while driving. I was also concerned that a driver may be watching TV while driving because the TV is also capable of reception of the standard broadcast band here in Japan.

So, I guess the gist of all this is, do the Japanese like toys much as we do? YOU BETCHA! I think they have taken the art of "toys for bigger boys" to an excellent extreme.

Well, as I said earlier, we're off for Hong Kong the week of May 6th. In my next 'challenge response' from our esteemed editor in chief, I'll let you in on what we did (and bought! I have KM4BU's ham shop addresses already in my wallet!) and how I like the 01' FT-1000D on the bands. Hopefully, by then, I'll have a "real"antenna up (versus the G5RV - probably won't be as elegant as N4BYO, AA4MY,or NO0T though) and you'se guyz n' galz can get us on the air from over here.

So, I (we) bid you a fond adieu until next time. Keep the repeater hot,the beers cold and the QRM heavy!
from 7J1AIW/N4XPE (KC4UOS on the side)
73 & 88 where they go...QRT CL RARS EXCITER

RX NOISE BRIDGE 160 THROUGH 10 METERS

By

Archie Archambault KA1JDY

This little known instrument has always interested amateurs when building transceiver antennas and finding resonant frequencies of tank circuits. Several articles have been published in QST and 73 Magazine. Also MFJ and Palomar have advertised a commercial product complete with battery at approximately $55 give or take a few.

Finding this rather a high price to pay for a few parts in a mini-box, I decided to construct one based on an article in 1982 ARRL Handbook, chapter 16-33434.

With a little investigation I found that Circuit Board Special sold a kit of parts including circuit board Fig. 71 & 72 for $16.60. The only extra part must purchase are a 0-150pf capacitor and a chassis box with 2 1/4" shaft knobs and 2 SO239 connectors. Total cost is approximately $25.

Parts list:

Radio Shack cabinet #270-25 4"x2"x5" $3.79
Radio Shack connector #278-201 .99
Circuit Board Specialist noise bridge kit $16.60
P.O. Box 969
Pueblo, Colo. 8100 303-542-5083

Capacitor 10-106pf pn 48b083c $2.00
Fair Radio Sales Co.
P.O. Box 1105
1016 East Eureka St.
Lima, Ohio 45802 419-223-2196

For those who do not like to look for parts but like to build kits, a complete kit is available from:

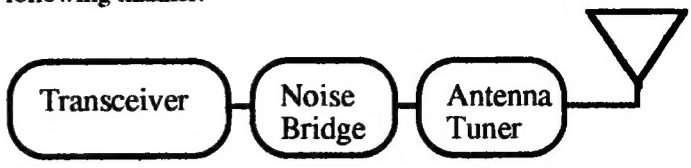
Radio Kit
Box 411
Greenville, N.H. 03048 603-878-1033

RX noise bridge Ham Radio Feb. 77 article complete kit including case & connector: $33.45
shipping: 2.50

$35.95

Construction and calibration should be directed to reference material of the '82 Handbook. One note, the top picture showing the completed noise bridge is incorrect, Fig. 68. Checking with the ARRL, this has been corrected in the '83 Handbook. The minus C scale for the capacitance dial is reversed. The plus C scale is ok.

A few tips on operation and test of your new instrument using existing transceiver and antenna system. For best results prior to on the air transmission connect your equipment in the following manner.



Repeat this procedure for each and every band and frequency you operate on. This will give you 50 ohms and a resonant antenna system every time you tune up to transmit. When you have completed your transmatch calibration chart you are ready to set up your transmitter. Disconnect the noise bridge from the transmitter. Connect the transmitter output to 50 ohm dummy load. Again repeat your frequency chart you previously made. Tune up your transmitter per your instruction manual, for drive, load and final. Adjust for maximum power. Maintain very short tune up, to enable output stage to remain "cool". After you have completed this chart of where all your controls are to be set prior to transmitting, you should never have to tune up on a station again! If any equipment is changed repeat this calibration and make a new chart.

For Unknown Antennas:

This procedure is for unknown antenna lengths. Use a general coverage receiver for easier results.

1. After building your antenna approximately where it will operate connect your newly made antenna to the noise bridge unknown connector and the receiver to the detector rec. connector. Set the noise bridge on.
2. Adjust for for center frequency that the antenna was cut for.
3. Adjust noise bridge dials for best null dip on receiver S meter.
4. Determine by reading dial settings if antenna is 50 ohms and "0" capacitance at that frequency. If resistance is 50 + - 25 and capacitance is on the +c side your antenna is too short. To verify this set dial at 50 ohms and "0" capacitance and record frequency where null dip occurs. You should read a higher frequency or receive where resonance occurs. The percentage difference between your desired frequency and your actual frequency is the percentage you must increase the length of your antenna by. If the capacitance dial was set to the -c side, the antenna is too long. Verify as you did for the +c except frequency will be lower for actual null dip (resonance). The percentage dip now is to decrease the length the antenna. Add or subtract to your antenna until 50 ohms + or - 25 and + or - 50 pf is obtained at (resonance) null dip. No matter what the antenna is, horizontal, vertical, , inverted V, beam or how high it is from the ground this little instrument will prove itself the most valuable tool in the radio shack.

Note: Bob very graciously brought his noise bridge over along with this article and we put the bridge through its paces with my rig and antennas. It proved to be far handier than a swr bridge for initial antenna adjustments and finding correct settings for the antenna tuner.

On SSB Signal Cleanliness - How to Watch For and Attain It.

On the subject of SSB signal cleanliness and how to achieve it. Let us discuss this since any signal that takes excessive bandwidth can cause serious interference to adjacent commercial, military, or other radio users. An improperly adjusted station can radiate a signal with effects out of its subband. We all know how such side effects can interfere unjustifiably with communications on our frequencies! SSB signal cleanliness can be defined in terms of RF bandwidth, carrier suppression, and audio frequency response over the desired bandwidth.

First let us look at some causes of "unclean" signals. Many of the manufactured equipment is reasonable clean, if adjusted at the designer's instructions and operated properly. Some hams build their own gear, so how can we avoid bad signals? What should we watch out for?

1. The most common cause of unclean signals is overdriving. This can result from setting the audio gain in an SSB exciter too high, by a faulty ALC circuit, or by too much dependence on ALC with high gain control setting. (I hear SSB signals that cause the signal-strength meter on my receiver to stand still. Voice peaks cause little fluctuation! This condition is always accompanied by spurious products extending many khz on each side of the passband.)

This type of signal is caused by ignorance or indifference. The operator talks too loud, or turns up the gain, to be heard better, (so he thinks!), by the DX station. The result is OVERDRIVING, peak flattening, and a spread spectrum. The signal is less readable than a clean signal and disrupts QSO's on both sides of this.

2. The plate current meter of the final amplifier in an SSB transmitter should swing no more than 50% of the peak envelope reading with the average human voice. (see W1DF's article, page 11 of November, 1982, QST.) Use of an audio compressor ahead of the SSB exciter will do more to avoid generation of spurious products than will ALC, whose adjustments can change with loading and frequency. The compressor can prevent overdriving all the way through and give about 3 db more "talk power".

Other sources of trouble can be non-linearity in the transmitter. Any non-linear device is a source of cross-modulation between two frequencies. The bias can be wrong, or a resistor can change value. Load impedance can be wrong, there can be a leaky by-pass capacitor or poor plate voltage regulation under varying load. Tubes can age and lose their peak emission capability. A tube can be fine for class c or CW, but not have enough emission for the peaks in SSB service. Non-linearity can happen in any stage.

The microphone should not have any undesirable peaks in its response curve, as these can cause spurious product generation. If the response is not smooth, changes should just drop off at the ends of the audio range. Peaks in the filter passband can cause overdriving, even when the DC plate current does not seem to be swinging too high, making for overdrive and unclean signals. There should be enough gain in the equipment to modulate fully with the mike at least six inches away from the face. One cause of poor audio is the practice of putting the mouth right on the microphone while speaking!

How do you measure the cleanliness or linearity of you SSB transmitter? One common method is to use an oscilloscope, with its familiar triangular pattern. This is generated by feeding audio input voltage to one set of scope plates and RF output to the other set. This will show overall linearity. This is fine, as far as it goes. However, there can be a non-linear stage with a droopy curve and another in the opposite sense with unwanted coupling or feedback, and the output will still have spurious products generated in these stages.

The most useful suggestion I can make is that every SSB station use a receiver as a monitor of its own signal. The transmitter is fed into a dummy load. One easy to check is to play music into the transmitter, (make sure your dummy load can't radiate!!!), and listen to it on your receiver. Any distortion will be apparent. If your SSB rig sounds clean with this test, the chance that it'll be clean on the air are very good! W3JHR in the Navy MARS Bulletin

Annual Membership Dues

Dues for the Hampden County Radio Association are $10/year. As a member of the HCRA you will receive 10 issues of Zero Beat, possible special notices of meetings, the ability to vote for officers and directors at the annual meeting, and the ability to submit your score towards the club score in radio competitions like the January VHF contest.

The club meets the first Friday of every month, except July and August, at the Feeding Hills Congregational Church, Feeding Hills, Mass. This is West of Springfield. Take route 57 West and at the intersection of routes 57 and 187, turn right. The church is immediately on your left!

You may sign up at any meeting by seeing the club treasurer,

Greg Stoddard N1AEH,
1500 Mapleton Ave
Suffield, CT 06078

or you may send your payment along with name, address, call, and license class to HCRA, P.O. Box 482, West Springfield MA, 01090-0482.

Short Wave Listening

By

Jeffrey J. Duquette K1BE

Radio amateurs often started in this hobby via shortwave listening. (SWL) Events this past year gave a real impetus to this exciting hobby. With so many modern transceivers used in the amateur service also providing frequency coverage of all short wave bands, you may want to take the opportunity to listen in.

Local and national television reports about the war in Iraq featured radio hams listening in to military frequencies, and these were listed here in Zero Beat. One club member was not happy about that, thinking they were "secret", but these have been published around the world for many years. Radio Baghdad was on 13660, 11860, and 11830 khz at about 2200 to 0200 UTC, with anti-American diatribes in English. This signal got weaker when the bombing started!

KOL Israel gave us live scud missile attacks! They are on 9435, 11585, 11605, 11655, and 15615 khz. You saw the reports of SWL's hearing the sirens going off and KOL Israel warning citizens to go to their sealed rooms. Many club members worked Israeli hams and discussed the same events. (Or heard them live!)

Radio Vilnius, in Lithuania was another interesting short wave event. As that little country struggled for independence, the Soviets took over their broadcast facilities. They continued on from hidden locations at reduced power. Radio amateurs took over and most of the information to the outside world was provided by them. QST had a lead article about this. You could have heard it live if you'd tuned into 11790 and 15485 khz at 2300 UTC. Radio amateurs had a net on 14153 khz USB with alternate frequencies at 7060 and 21220 khz.

Here are other English language short wave broadcasts. The list could go on for pages. All frequencies are in khz, time is in UTC.

Time	Station	Frequencies
0000	Radio Moscow	11735 11860
	Radio Havana	11820
	Radio North Korea	11335
0100	Radio Yugoslavia	11735
0200	Radio Taiwan	15345
0300	Radio Beijing	11715
0500	Voice of Nigeria	7255
1200	Radio France	17650
	Voice of Vietnam	12020

Pick up a copy of **Popular Communications** if you're interested in learning more about SWLing today. Is anyone interested in doing a regular column for Zero Beat?

RADIO MEMORIES

By

Bob Stephens W1MM

Early "Wireless" Interest Prior to WW1

One of my friends had an older brother who had a spark transmitter and a crystal detector receiver with which he could communicate around town. This greatly intrigued my friend and myself. We attempted to build smaller versions of this station and copied equipment as shown in Boys Life Magazine, without any real success other than learning the Morse Code.

WW1 Wireless Operation

While attending Hastings, Neb. High School in the fall of 1917, all male students were required to take military training in the Student Army Training Corps, and drill for one hour each morning before regular classes. Our Physics professor was one of the drill instructors, and informed his classes that anyone interested in Wireless would be assigned to a special Signal platoon, and thereby get out of the regular infantry drills. He had no trouble getting recruits and thus in place of drilling, our drill periods were taken up learning the code and code practice. The class also put together spark coil transmitters and carrying handles. As part of the morning drills, this "portable" equipment was carried a few blocks away and communications back to the base station in the Physics lab were made. This training continued up until the end of the war.

Post WW1 Wireless Operation

After lifting the ban on Amateur Radio, our Physics class instructor obtained a school radio club license with the call 90T. Along with most of the other fellows in the class I obtained an Amateur Radio Operators license. We spent many hours at 90T operating its 1/2 KW spark transmitter. In the mean time I put togetlfer a 1 inch spark coil transmitter and a crystal detector receiver, and soon obtained my license 9AVC. To the best of my knowledge and from notations on photographs of my station, this license was issued late in 1919. Late that year I put together a 1 KW spark transmitter, with home built rotary gap, and photographic glass plate with tin-foil and immersed in oil for the condenser, Thordarson transformer and pancake oscillation transformer. Antenna was a 4 wire flat top up about 45 feet. The receiver was a one tube Audion which had double filaments (one a spare) and homemade spider web coils.

The homemade rotary gap was very noisy and was soon replaced by an enclosed Benwood gap, and the receiver grew into a good sized one with detector and 2 stage amplifier. I have photos of this rig captioned "Bob" and His Bug", 9AVC, 1919-1920.

In the summer of 1922 the spark set was scrapped in favor of the new mode CW. A transmitter using a pair of 203s was constructed and a new receiver using a "Reinartz" tuner and several stages of audio replaced the older receiver. Needless to say, this equipment ran rings around the older spark outfit. Now in place of only a few hundred miles, it was no problem working with either coasts. The rectifiers for the HV power supply we called "slop jar" rectifiers made up of aluminum and lead strips immersed solution of water and soda. These created quite a visual effect with a scintillating glow on the electrodes as the power supply was keyed. Voice communication was also possible by modulation of the carrier by means of absorbtion loop modulation with parallel carbon microphones in series with the loop and inductively coupled to the antenna coupler coil. 9AVC went QRT in 1924 when I went away to the University of Nebraska at Lincoln.

Post College Radio Amateur Activity

Upon graduation, I was employed by the General Electric Co. in Schenectady, N.Y. as a test engineer and upon completion of the test program was employed as a regular Electrical Engineer. Shortly thereafter I was engaged to my present XYL who was also from Hastings, Neb. With a permanent place of residence, I again turned to Ham Radio and obtained a new call, W2AEW. I started off again with a home brew rig using a UV210 and a SW3 receiver, also home brewed. I guess none of my rigs ever stayed the same over a few months, as I was a dyed in the wool builder of both transmitters, receivers, and antennas.

In 1935 GE transferred me to Pittsfield, Mass. where I soon received call W1JLT. Later when the call W1AEW was vacated, I applied for it and held that call some time. After obtaining my Extra Class license, I applied for a two letter call and got W1MM in February of 1969.

In 1955 GE transferred me to their Holyoke, Mass. plant. I retired in 1967 after being with GE for nearly 40 years.

My main Ham Radio interests have been CW work, building all kinds of equipment and antennas, rag chewing, radio club work, DX and contests, some traffic work and a very little of phone and UHF activity.

Now that I am retired, I had hoped to have more tine for Ham Radio, but find that I spend about the same amount of time at it, as I did when working a regular job. Other interests and hobbies seem to be taking up the slack that was available with the regular job chores ceased.

Robert N. Stevens, W1MM, Amateur Extra Class License
Ex 9AVC, W2AEW, W1JLT, and W1AEW
First Licensed Amateur Radio Operator 1919
W.A.S., W.A.C., W.A.Z., DXCC #321QCWA #3156 OOTC #416

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Newsletter Exchange

The HCRA welcomes the opportunity to exchange newsletters gratis with clubs outside of the area. Contact the editor:

Jeffrey J. Duquette K1BE
18 Anvil Street
Feeding Hills, MA 01030-1530

Next Meeting
Friday November 1st
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